Bachelor of Software Engineering

Session 2024/2025 Semester1

SECR 1213 Network Communication

Section - 16

Lecturer: Dr. Kaiyisah Hanis Mohd Azmi

Task5

Submitted by : Grop G

Liu Wanpeng(A23MJ4016)

Zhao Wei (A23MJ4018)

Thamer Alharbi (A23MJ4015)

Date of Submission: October 29, 2024

TASK 5: IP ADDRESSING SCHEME

Catalogue

Project Overview

This report details the IP addressing scheme designed for the network infrastructure outlined in the floor plan. The scheme ensures efficient use of IP addresses, avoiding conflicts while supporting all devices in the labs, classroom, public areas, and storage servers.

---

1. Network Address Details

The network address assigned to the group is as follows:

- **Class:** Class C
- **Network Address:** 192.168.0.0/24
- **Total Available IPs:** 256 (254 usable IPs after network and broadcast exclusion)

---

2. Subnet Division

Each subnet is designed to accommodate the specific number of hosts in each work area, including a 20% buffer for future expansion.

Work Area	Number of Devices	Subnet Mask	Subnet Size	Assigned Subnet	Host IP Range	Broadcast Address
Embedded Lab	32	/26	64	192.168.0.0/26	192.168.0.1 - 192.168.0.62	192.168.0.63
Cisco Lab	30	/26	64	192.168.0.64/26	192.168.0.65 - 192.168.0.126	192.168.0.127

General Lab 1	30	/26	64	192.168.0.128/26	192.168.0.129 - 192.168.0.190	192.168.0.191
General Lab 2	30	/26	64	192.168.0.192/26	192.168.0.193 - 192.168.0.254	192.168.0.255
Classroom	30	/26	64	192.168.1.0/26	192.168.1.1 - 192.168.1.62	192.168.1.63
Integrated Area	10	/28	16	192.168.1.64/28	192.168.1.65 - 192.168.1.78	192.168.1.79
Rest Area	10	/28	16	192.168.1.80/28	192.168.1.81 - 192.168.1.94	192.168.1.95
Storage Server (1st Floor)	1	/30	4	192.168.1.96/30	192.168.1.97 - 192.168.1.98	192.168.1.99
Storage Server (2nd Floor)	1	/30	4	192.168.1.100/30	192.168.1.101 - 192.168.1.102	192.168.1.103

3. Network Devices Overview

Routers

- **Purpose:** Facilitate communication between subnets and provide gateway functionality for each network segment.
- **Model:** Cisco ISR 4000 Series
- **Assigned IPs:** Each subnet has a dedicated gateway IP assigned to the router.

- Configuration:
  - Embedded Lab: 192.168.0.1
  - Cisco Lab: 192.168.0.65
  - General Lab 1: 192.168.0.129
  - General Lab 2: 192.168.0.193
  - Classroom: 192.168.1.1
  - Integrated Area: 192.168.1.65
  - Rest Area: 192.168.1.81
  - Storage Server (1st Floor): 192.168.1.97
  - Storage Server (2nd Floor): 192.168.1.101
- Key Features:
  - Advanced routing capabilities.
  - VLAN support for segmentation.
  - Security features, including access control and NAT.

Switches

- Purpose: Provide connectivity for devices within each subnet and manage local traffic.
- Model: Cisco Catalyst 9200 Series (48 Ports)
- Quantity: 6 total, 1 per work area.
- Configuration:
  - VLANs configured for each subnet.
  - Redundant links to ensure high availability.
- Key Features:
  - Stacking support for scalability.
  - QoS for traffic prioritization.
  - Port security for unauthorized access prevention.

Wi-Fi Access Points

- Purpose: Provide wireless connectivity in labs, classroom, and public areas.
- Model: Cisco Catalyst 9100 Wi-Fi 6 Access Points
- Quantity: 7 total, strategically placed for optimal coverage.
- Assigned IPs:
  - Embedded Lab: 192.168.0.34
  - Cisco Lab: 192.168.0.96

    - General Lab 1: 192.168.0.160
    - General Lab 2: 192.168.0.224
    - Classroom: 192.168.1.32
    - Integrated Area: 192.168.1.66
    - Rest Area: 192.168.1.82
- Key Features:
    - High-density performance with Wi-Fi 6.
    - Security features including WPA3 and rogue AP detection.
    - Support for up to 200 concurrent devices per AP.

Multi-Terabyte Storage Servers

- Purpose: Provide centralized storage for all labs and classrooms with high availability.
- Models: Dell EMC PowerVault ME4 Series
- Configuration:
    - 1st Floor Storage Server:

1. Static IP: 192.168.1.98
2. Connected directly to MDF with a 10Gbps link.
3. Supports RAID 6 for data redundancy.
4. Initial storage capacity: 50TB, expandable to 100TB.

    - 2nd Floor Storage Server:

5. Static IP: 192.168.1.102
6. Connected directly to MDF with a 10Gbps link.
7. Supports RAID 6 for data redundancy.
8. Initial storage capacity: 50TB, expandable to 100TB.

---

4. IP Assignment Details

To prevent conflicts and ensure proper network functionality, IPs are assigned as follows:

Embedded Lab:

- Router: 192.168.0.1
- PCs: 192.168.0.2 - 192.168.0.33

- Wi-Fi AP: 192.168.0.34
- Reserved: 192.168.0.35 - 192.168.0.62

Cisco Lab:

- Router: 192.168.0.65
- PCs: 192.168.0.66 - 192.168.0.95
- Wi-Fi AP: 192.168.0.96
- Reserved: 192.168.0.97 - 192.168.0.126

General Lab 1:

- Router: 192.168.0.129
- PCs: 192.168.0.130 - 192.168.0.159
- Wi-Fi AP: 192.168.0.160
- Reserved: 192.168.0.161 - 192.168.0.190

General Lab 2:

- Router: 192.168.0.193
- PCs: 192.168.0.194 - 192.168.0.223
- Wi-Fi AP: 192.168.0.224
- Reserved: 192.168.0.225 - 192.168.0.254

Classroom:

- Router: 192.168.1.1
- PCs: 192.168.1.2 - 192.168.1.31
- Wi-Fi AP: 192.168.1.32
- Reserved: 192.168.1.33 - 192.168.1.62

Integrated Area:

- Router: 192.168.1.65
- Wi-Fi AP: 192.168.1.66
- Reserved: 192.168.1.67 - 192.168.1.78

Rest Area:

- Router: 192.168.1.81
- Wi-Fi AP: 192.168.1.82
- Reserved: 192.168.1.83 - 192.168.1.94

Storage Servers:

- 1st Floor Storage Server:

- Router: 192.168.1.97
- Server: 192.168.1.98

- **2nd Floor Storage Server:**

- Router: 192.168.1.101
- Server: 192.168.1.102

---

5. Addressing Scheme Validation

- **Subnetting Compliance:** Each subnet uses a mask (/26, /28, or /30) suitable for the number of devices, ensuring no address conflict.
- **Scalability:** Each subnet includes a buffer for future expansion.
- **Unique Assignment:** All devices have unique IPs, avoiding duplication.

---

6. Meeting Notes

MEETING MINUTES

DATE/TIME:	December 18, 2024, 10:00 AM
LOCATION:	Zoom Virtual Meeting
AGENDA:	Subnet Division, Device IP Assignment, and Report Planning
Meeting MC:	Liu Wanpeng

ATTENDANCE

NAME	TIME	REASON FOR ABSENCE
Liu Wanpeng	10:00	-
Zhao Wei	10:05	-
Thamer Alharbi	10:08	-

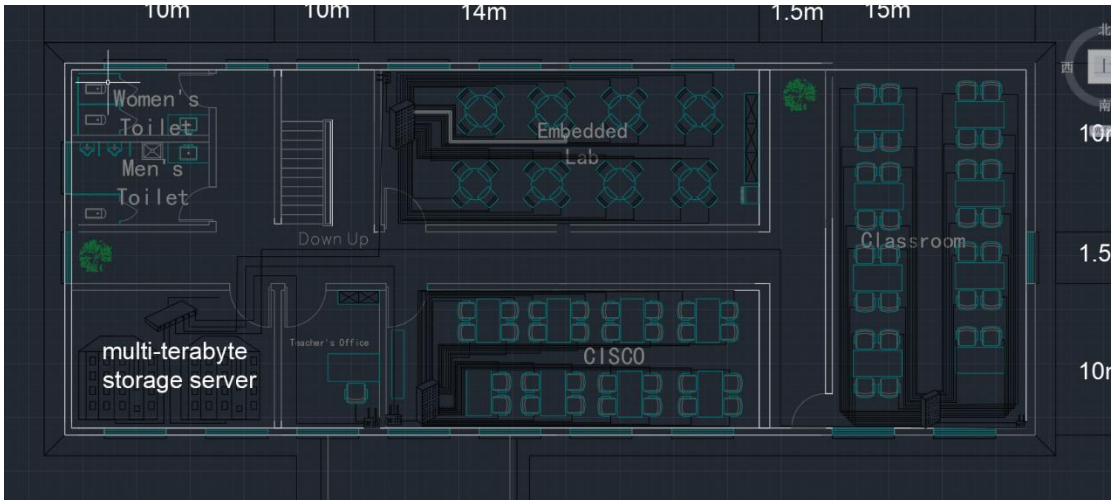
MINUTES

NO.	ITEM DISCUSSED	IDEAS/SUGGESTIONS AND PERSON GIVING IT	PERSON IN CHARGE & DATE
1	Subnet Division	Liu proposed using subnet masks /26, /28, and /30 based on device requirements and expansion buffer.	Liu (18/12)
2	Device IP Assignment	Zhao suggested allocating unique static IPs for routers, Wi-Fi APs, and storage servers.	Zhao (18/12)
3	Multi-Terabyte Storage Server Configuration	Thamer highlighted the importance of separating 1st and 2nd floor storage servers into distinct subnets.	Thamer (18/12)
4	Final Report Draft Planning	Liu assigned each team member a section of the report to finalize by December 22.	Liu (22/12)
5	Meeting Ended	Meeting concluded at 11:15 AM.	

Meeting on Scoring Sheet

NAME	SCORING CRITERIA	SCORE (1-5)
Liu Wanpeng	Host's Performance	5
	Clarity of Agenda	5
	Team Participation	4.5
	Decision-Making Efficiency	5
	Task Allocation	5
Overall Score		**5**
Zhao Wei	Host's Performance	4.5
	Clarity of Agenda	5
	Team Participation	4.5
	Decision-Making Efficiency	4.5
	Task Allocation	4.5
Overall Score		**4.5**
Thamer Alharbi	Host's Performance	4
	Clarity of Agenda	4.5
	Team Participation	4.5
	Decision-Making Efficiency	5
	Task Allocation	4
Overall Score		**4.5**

7. Overview


10m
10m
14m
1.5m
15m
Women's Toilet
Men's Toilet
Down Up
Embedded Lab
Classroom
multi-terabyte storage server
Teacher's Office
CISCO
10m
1.5
10m


Women's Toilet
Men's Toilet
multi-terabyte storage server
Up
General Purpose Lab
General Purpose Lab
Integrated Service Area
Rest Area
-0.300
i=1:12
Up
18m
3.5m